

<b>SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT</b>
--

---

**RULE 2202 - ON-ROAD MOTOR VEHICLE MITIGATION OPTIONS**  
**IMPLEMENTATION GUIDELINES**

**JANUARY 2002**

**Executive Officer**  
Barry R. Wallerstein, D.Env.

**Deputy Executive Officer**  
**Office of Public Affairs & Transportation Programs**  
Marilyn F. Solomon

**Manager**  
**Transportation Programs**  
Carol A. Gomez

---

AUTHOR:	SHASHI SINGEETHAM - TRANSPORTATION SPECIALIST
REVISIONS:	JEANIE STOCKWELL - TRANSPORTATION SPECIALIST

*[This page intentionally left blank]*

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT  
GOVERNING BOARD**

**CHAIR:** NORMA J. GLOVER  
Councilmember, City of Newport Beach

**VICE CHAIR:** WILLIAM A. BURKE, Ed.D.  
Speaker of the Assembly Appointee

**MEMBERS:**

MICHAEL D. ANTONOVICH  
Supervisor, Los Angeles County

HAL BERNSON  
Councilmember, City of Los Angeles

JANE W. CARNEY  
Senate Rules Committee Appointee

BEATRICE J.S. LAPISTO-KIRTLEY  
Councilmember, City of Bradbury

RONALD O. LOVERIDGE  
Mayor, City of Riverside

JON D. MIKELS  
Supervisor, San Bernardino County

LEONARD PAULITZ  
Mayor Pro Tem, City of Montclair

JAMES W. SILVA  
Supervisor, Orange County

CYNTHIA VERDUGO-PERALTA  
Governor's Appointee

S. ROY WILSON, Ed.D.  
Supervisor, Riverside County

**EXECUTIVE OFFICER:**

BARRY R. WALLERSTEIN, D.Env.

*[This page intentionally left blank]*

# TABLE OF CONTENTS

<b>I.</b>	<b>BACKGROUND -----</b>	<b>1</b>
A.	SUMMARY -----	1
B.	EMISSION REDUCTION TARGET (ERT)-----	2
C.	POLLUTANTS CONSIDERED -----	2
<b>II.</b>	<b>EMISSION REDUCTION STRATEGIES -----</b>	<b>3</b>
A.	MOBILE SOURCE EMISSION REDUCTION PROGRAMS -----	3
B.	ERC FROM STATIONARY SOURCES -----	3
C.	AIR QUALITY INVESTMENT PROGRAM (AQIP)-----	4
1.	<i>Emission Reductions</i> -----	4
a)	Real Reductions -----	4
b)	Surplus Reductions -----	5
c)	Quantifiable Reductions -----	5
d)	Enforceable-----	5
<b>III.</b>	<b>TRIP REDUCTION STRATEGIES -----</b>	<b>6</b>
A.	PEAK COMMUTE TRIP REDUCTIONS -----	6
B.	OTHER WORK-RELATED TRIP REDUCTIONS-----	6
C.	VEHICLE MILES TRAVELED (VMT) PROGRAMS -----	7
D.	PARKING CASH-OUT PROGRAM-----	7
E.	EMPLOYEE COMMUTE REDUCTION PROGRAMS -----	7
<b>IV.</b>	<b>PROGRAM ADMINISTRATION -----</b>	<b>8</b>
A.	REGISTRATION -----	8
B.	REGISTRATION FORM -----	8
C.	VTEC CALCULATIONS -----	8
D.	AIR QUALITY INVESTMENT-----	8
E.	RECORDKEEPING -----	9
F.	COMPLIANCE-----	9
G.	SPECIAL PROCEDURES -----	9
1.	<i>Extensions</i> -----	9
2.	<i>Change of Ownership</i> -----	10
3.	<i>Relocation</i> -----	11
4.	<i>Registration Disapproval Appeals</i> -----	11
5.	<i>Delay Registration Review Requests</i> -----	11
<b>V.</b>	<b>APPENDIX A -----</b>	<b>14</b>
A.	EMISSION REDUCTION TARGET (ERT)-----	14
B.	VEHICLE TRIP EMISSION CREDIT (VTEC)-----	16
C.	EMISSIONS CALCULATION DATA -----	16
D.	EMISSION CREDITS FROM OLD-VEHICLE SCRAPPING -----	18
<b>VI.</b>	<b>APPENDIX B -----</b>	<b>19</b>
A.	EMISSION GENERATION-----	19
B.	EMFAC AND BURDEN MODELS-----	19
C.	DAILY COMMUTE VEHICLE EMISSION FACTOR -----	20
D.	EMISSION FACTOR DATA -----	21
<b>VII.</b>	<b>GLOSSARY -----</b>	<b>24</b>

*[This page intentionally left blank]*

## LIST OF TABLES

TABLE I-1: EMISSION REDUCTION OPTIONS-----	1
TABLE V-1: EMPLOYEE EMISSION REDUCTION FACTOR: PERFORMANCE TARGET ZONE-1 -----	14
TABLE V-2: EMPLOYEE EMISSION REDUCTION FACTOR: PERFORMANCE TARGET ZONE-2 -----	15
TABLE V-3: EMPLOYEE EMISSION REDUCTION FACTOR: PERFORMANCE TARGET ZONE-3 -----	15
TABLE V-4: EMISSION FACTORS (LBS/YEAR PER DAILY COMMUTE VEHICLE)-----	17
TABLE VI-1: VEHICLE TRIP GENERATED EMISSION SOURCES -----	19
TABLE VI-2: VOC MOBILE SOURCE EMISSION FACTORS -----	21
TABLE VI-3: NOx MOBILE SOURCE EMISSION FACTORS-----	22
TABLE VI-4: CO MOBILE SOURCE EMISSION FACTORS -----	22

*[This page intentionally left blank]*



## I. BACKGROUND

### A. Summary

Rule 2202 has been designed to reduce emissions from mobile sources. The Rule provides employers with a menu of options that they can choose from to implement and meet the emission reduction target (ERT) for their worksite.

The purpose of this document is to provide guidelines for compliance with the provisions of Rule 2202. The various emissions reduction strategies and trip reduction strategies currently contained in the Rule that employers can implement and receive credit towards their ERTs are listed in the Table below.

Emission Reduction Strategies	Trip Reduction Strategies
<ul style="list-style-type: none"> <li>• Old Vehicle Scrapping (Rule 1610)</li> <li>• Clean On-Road Vehicles (Rule 1612)</li> <li>• Clean Off-Road Mobile Equipment</li> <li>• Other Mobile Source Offset Programs (Programs Regulation XVI)</li> <li>• Air Quality Investment Program</li> <li>• Emission Reduction Credits From Stationary Sources (Regulation XIII)</li> <li>• Area Source Credits</li> </ul>	<ul style="list-style-type: none"> <li>• Peak Commute Trip Reductions</li> <li>• Other Work-Related Trip Reductions</li> <li>• Vehicle Miles Traveled (VMT) Programs</li> </ul>

**Table I-1: Emission Reduction Options.**

As an alternative to meeting the ERT at their worksite the Rule allows the employers optional implementation of an Employee Commute Reduction Program (ECRP). Implementation details of this strictly optional program are included in the ECRP Guidelines. The Implementation Guidelines outlines the framework, calculation methodology, and criteria used in determining emission reductions credits and vehicle trip emission credits (VTECs) that can be applied towards meeting emission reduction targets (ERT).

## **B. Emission Reduction Target (ERT)**

Employers subject to Rule 2202 are required to implement an emission reduction program and meet an annual ERT for Volatile Organic Compounds (VOC), Oxides of Nitrogen (NO<sub>x</sub>) and Carbon Monoxide (CO). Figure 1-1 outlines the equation used to determine the ERT for each pollutant. A complete discussion on emissions reduction is contained in Appendix A.

$$\left[ \begin{array}{c} \text{Emission} \\ \text{Reduction Target} \\ \text{(lbs / year)} \end{array} \right] = \left[ \text{Employees} \right] \times \left[ \begin{array}{c} \text{Employee Emission} \\ \text{Reduction Factor} \end{array} \right] - [\text{VTEC}]$$

**Figure I-1. Emissions Reduction Target Determination.**

For further explanation of the above formula refer to Appendix A.

## **C. Pollutants Considered**

Vehicle trips are responsible for the emissions of VOC, NO<sub>x</sub>, and CO. Most trip reduction programs reduce emissions by similar relative amounts. Emission reduction strategies, however, aimed primarily at reducing emissions rather than trips, may reduce emissions by different relative amounts. Rule 2202 is designed to reduce emissions of VOC, NO<sub>x</sub>, and CO, by an equal or greater amount to that achievable through trip reduction. Rule 2202 allows employers to select and implement a combination of emission reduction strategies and meet the site-specific ERTs for VOC, NO<sub>x</sub>, and CO.

## **II. EMISSION REDUCTION STRATEGIES**

The emission reduction strategies considered in this document may include, scrapping, clean on-road vehicles, clean off-road vehicles, other mobile source offset programs under Regulation XVI, ERC from stationary sources and air quality investment. In addition, companies can meet the emission reduction requirements, in whole or in part, by obtaining sufficient VTECs.

### **A. Mobile Source Emission Reduction Programs**

Any person may elect to use mobile source emission credits (MSERCs) generated in accordance with the provisions of Regulation XVI - Mobile Source Offset Programs. Regulation XVI sets forth the requirements that are based on voluntary programs that achieve emission reductions beyond those required by local, state and federal regulations or programs. Employers may generate MSERCs through the voluntary implementation of any Regulation XVI program and apply them toward meeting the ERT for their site or trade and/or sell them to other employers. Alternatively, employers that have a shortfall in meeting their ERTs can purchase surplus MSERCs from other employers or a credit vendor.

Rule 2202 offers employers the opportunity to obtain VTECs from the implementation of optional trip reduction strategies. These VTECs, obtained through peak-commute trip reductions, other work-related trip reduction, VMT offsets or employee commute reduction programs, can be applied towards meeting an employer's ERT. Credit for any program must go beyond the requirements of existing state and federal programs to avoid "double counting" the emission reductions.

### **B. ERC From Stationary Sources**

Any person may elect to use ERC generated by stationary sources after January 1, 1996, in accordance with the provisions of Regulation XIII - New Source Review. Regulation XIII sets forth the requirements that proposed new or modified stationary sources must meet before construction can take place. These requirements are in addition to those specified by other rules and include use of Best Available Control Technology (BACT), and use of ERC to offset any emission increases. Employers may reduce emissions through the installation of air pollution control technologies, process modifications, or equipment shutdowns and generate ERCs and apply them towards meeting the ERT for their site or trade them to other employers or stationary sources.

### **C. Air Quality Investment Program (AQIP)**

The concept of an AQIP is based on relative cost-effectiveness. Employers may participate in the AQIP by submitting an air quality investment, to be placed in a restricted fund as set forth in Rule 311 - Air Quality Investment Program Fees.

The AQMD Executive Officer will recommend to the AQMD Governing Board, for approval, on a quarterly basis, the release of monies from the restricted fund for emissions reductions programs that achieve emissions reductions equivalent to the level of employers' participation.

Proposals for using monies from the restricted fund will be accepted by the AQMD Executive Officer on an ongoing basis. The AQMD Executive Officer will determine the amount of mobile source emission reductions required to demonstrate equivalent emissions reductions and the amount that will be achieved by the proposal. The Executive Officer will then recommend the most cost-effective proposals that achieve equivalent mobile source emissions reductions. In addition, the Executive Officer will recommend that the allocation of funding for proposals that reduce equivalent emissions within each county be proportional to the contribution level of employers within each county. On a quarterly basis, the Executive Officer will provide to the AQMD Governing Board a status report on program effectiveness and the balance of monies in the fund.

#### ***1. Emission Reductions***

Any proposed program seeking AQIP funding should contain an emissions or trip quantification methodology which follows the general format outlined in Appendix A. Any proposed program may be submitted in combination with other programs, including, but not limited to, old vehicle scrapping or work-related trip reduction programs. AQMD will evaluate programs to assure that they produce emissions or trip reductions that are real, surplus, quantifiable, and enforceable.

##### **a) Real Reductions**

"Real" reductions are those that result in actual emission reductions and do not occur as a result of accounting practices, or "paper reductions." The key test in determining whether a strategy will result in real reductions is in establishing a proper emissions or trip baseline level. If, for example, facility XYZ has reduced emissions in excess of those required by the ERT, no "real" reductions will result from the establishment of ERT as a performance standard. Therefore, all quantification methodologies will be required to establish a standardized baseline condition, or use a default condition established by the Executive Officer, from which to calculate real emissions or trip reductions.

**b) Surplus Reductions**

"Surplus" reductions occur when an action is taken beyond existing and planned regional, state, and federal requirements. Obtaining surplus emission reductions means the benefit of a control strategy is not "double counted." In many cases, the proposed strategy requirements overlap completely with another rule, regulation, statute, or legislation. However, by revising the strategy to become more stringent, the action would become partially creditable, or surplus. To meet this surplus criterion, all quantification methodologies will be required to include a mechanism for subtracting any regulatory overlaps with the standardized baselines established to meet the "real" criterion described earlier.

**c) Quantifiable Reductions**

Although TCM strategies involve some degree of variance and uncertainty, creditable actions can be quantified through use of assumptions that are based either on case studies or on transportation supply and demand theories. Each assumption that is used to assign effectiveness or efficiency should be matched with either a case study, or on some measurable parameter. Basic "intuition," especially for indirect actions such as general education, "goodwill," or other "good faith efforts," is not sufficient. Quantifiability is the main criterion used to determine the extent of any credit discounting. Those actions which are more easily quantified, with strong assumptions, would have limited discounting applied, while the more "intuitive" actions would need to be discounted to a much greater extent.

**d) Enforceable**

In addition, each proposed program should include a recordkeeping mechanism for compliance verification, as outlined in Chapter 4. The enforceability component requires that all records, sufficient to demonstrate compliance, be maintained by participating companies and be made available to the AQMD upon request.

### III. TRIP REDUCTION STRATEGIES

Rule 2202 offers employers the opportunity to obtain VTECs from the implementation of the following optional trip reduction strategies. These VTECs, obtained through peak-commute trip reductions, other work-related trip reduction, VMT offsets or employee commute reduction programs, can be applied towards meeting an employer's ERT.

#### A. Peak Commute Trip Reductions

Rule 2202 provides the option to obtain credit for reducing employee commute trips. Specifically, employers can reduce trips to work that occur during the morning peak congestion period (or "Peak Window") by creating incentives for ridesharing and other alternative transportation modes. VTECs shall be calculated using the formula in Figure III-1.

$$\text{VTEC} = [\text{Creditable Commute Vehicle Reductions (CCVR)}] \times \left[ \frac{\text{Emission Factor (EF)}}{\text{lbs/year}} \right]$$

where

CCVR = The daily average of total commute vehicle reductions that are real, surplus, and quantifiable.

EF = Emission Factor

**Figure III-1. Vehicle Trip Emission Credit Generation for Work-Related Trip Reduction Programs.**

#### B. Other Work-Related Trip Reductions

Employers may receive additional VTECs from employee commute reductions that occur outside of the peak window or from non-commute vehicle usage. VTECs from Other Work-Related Trip Reductions can be calculated using the formula in Figure III-2. The conversion factor is used to convert vehicle trip reductions to commute vehicles reductions and accounts for the return trip home, and includes an additional adjustment to account for other vehicle usage reduction during and outside the peak window. Appendix A contains a complete discussion on the generation of VTECs.

$$\text{VTEC} = \left[ \frac{\text{Creditable Trip Reductions (CTR)}}{\text{CF}} \right] \times \left[ \frac{\text{Emission Factor (EF)}}{\text{lbs/year}} \right]$$

where

CTR = The daily average of total one-way trip reductions that are real, surplus, and quantifiable. A round trip is considered to be two one-way trips.

CF = 2.0 for A.M. Peak Window  
2.3 for Other Trips

EF = Emission Factor

**Figure III-2. Vehicle Trip Emissions Credit Generation for Peak-Commute and Other Work Related Trip Reduction Programs.**

### **C. Vehicle Miles Traveled (VMT) Programs**

Employers may elect to implement VMT reduction programs and receive VTECs toward their ERT. Reduction of annual employee commute VMT that may result from employment center relocation, video-conference centers, telecommuting centers or other alternative programs approved by the Executive Officer or designee. The Executive Officer shall not approve any VTEC program for VMT reduction unless it includes baseline VMT estimates and demonstrates that VMT reductions result in quantifiable, and surplus emission reductions. See Appendix B formulas required for these calculations.

### **D. Parking Cash-Out Program**

Employers may elect to implement a Parking Cash-Out Program to reduce employee commutes and receive VTEC toward meeting their ERT. Parking Cash-Out is a program where an employer offers to provide a cash allowance to an employee equivalent to the parking subsidy that the employer would otherwise pay to provide the employee with a parking space. VTEC calculation formula for this program is same as the one used for Other Work-Related Trip Reductions.

### **E. Employee Commute Reduction Programs**

Details of this exemption are provided elsewhere in a companion guidance document titled "Employee Commute Reduction Program Guidelines."

## **IV. PROGRAM ADMINISTRATION**

### **A. Registration**

Companies participating in the Rule 2202 On-Road Motor Vehicle Mitigation Options emissions reduction program are required to notify the AQMD which option or options are selected through registration. Company registration serves the purpose of both notifying the AQMD of the intent to implement options provided in the program, and also serves to identify the goals of the chosen options, including any demonstrations required. Registration shall be renewed annually.

### **B. Registration Form**

Companies must identify which options will be used to attain their ERT. The notification must include information which identifies the company and the worksites affected by the emissions reduction program, including the number of employees reporting to the worksite during the morning peak congestion period and the total employee count at the worksite.

### **C. VTEC Calculations**

Employers claiming VTECs from the implementation of the optional Vehicle Trip Reduction strategy shall include as a part of their registration all VTEC calculations. All supporting documents shall be maintained on site for three years. Emission factors (i.e., pounds of pollutant per vehicle-year) to be used in the calculations are provided in this document.

### **D. Air Quality Investment**

AQMD Executive Officer will determine the amount of mobile source emissions for air quality investment programs when proposals are submitted for approval. Individual companies seeking this safe harbor alternative are not responsible for



demonstrating emissions reduction equivalency; they are only responsible for keeping records of employment, and of "in-lieu fee" submittal.

**E. Recordkeeping**

The enforceability component of the On-Road Motor Vehicle Mitigation Options program requires that all records, sufficient to demonstrate compliance, be maintained by participating companies for a period of no less than three years and made available to the AQMD upon request in order to determine compliance. Specifically, participating companies should maintain a copy of the following records at all worksites:

- Registration form
- VTEC data and calculations
- List of program strategies or elements used for implementation

**F. Compliance**

Compliance with an alternative emission reduction program will be determined through an employer review process conducted by the AQMD. Compliance requirements for the "Employee Commute Reduction" exemption are included in the ECRP Guidelines.

Examples of violations of Rule 2202 would include: failure to maintain records; fabrication of records; or failure to obtain the amount of VTECs or emissions reductions identified as part of the company's registration submittal. In addition, failure to submit air quality investment "in-lieu" fees would be constituted as a violation of Rule 2202 for employers selecting this option.

**G. Special Procedures**

**1. Extensions**

Any employer may request an extension to the registration due date under the following circumstances:

- If an employer needs more time to submit a registration to meet the requirements of Rule 2202, additional time may be requested from the AQMD. The request must be in writing, state the reason for the extension request, the length of time needed, and include the appropriate filing fee.
- All extension requests and fees must be received by the AQMD, no later than 15 calendar days prior to the program due date;
- Requests are considered on a case-by-case basis and are granted for reasons that are beyond the control of the employer;
- An employer may request an extension to the registration due date after the registration has been disapproved for the first time. The request must be received within 15 days of the receipt of the registration disapproval. The AQMD will inform the employer in writing within 15 calendar days of receipt of request, whether the extension has been granted;
- An employer may, upon receipt of a written objection to the terms of the proposed registration by an employee, employee representative or employee organization, request a single extension of 30 days. A copy of the written objection should be attached to the request. One such request shall be granted by the AQMD; no subsequent extension may be granted for this purpose; and
- Any change in the permanent due date that results in additional time to submit a registration will be considered an extension of time and shall be subject to an extension filing fee.

## **2. *Change of Ownership***

In the case of ownership mergers, or change of ownership, the new owner must notify AQMD of this change within 30 days of the new ownership. The District will then send a notification letter to the new employer, and 90 days from receipt of the letter, the employer must submit a registration or Employee Commute Reduction Program to the AQMD which adheres to all provisions of Rule 2202 and Guidelines for the option. The new owner(s) may choose to submit a new management commitment letter, instead of a new registration or program, which states they will continue to implement the registration or program last approved by the AQMD.

### **3. *Relocation***

Any employer relocating to a new worksite must notify the AQMD within 30 days of the relocation. Relocations fall into two categories and are explained below:

- Employers relocating within two miles of the previous worksite address may elect to continue to implement the most recently approved registration or program. Or, the company may elect to submit a new registration or program. The employer must inform AQMD of the preference in the notification of relocation letter. If no preference is made in the letter, the company will automatically be sent an official notification package and will be required to submit a new registration or program within 90 days of receipt of the notification package.
- Employers relocating more than two miles from the previous worksite are required to submit a new registration or program. The employer must submit the new registration or program within 90 days from receipt of the notification package from AQMD.

### **4. *Registration Disapproval Appeals***

The AQMD has 90 days to review the resubmitted registration. If the employer believes that the program meets the requirements of Rule 2202 and the Guidelines, and that the registration was improperly disapproved, the employer may appeal the disapproval to the AQMD Hearing Board. A petition for appeal of a disapproval must be made within 10 calendar days after the employer receives the notice of disapproval.

### **5. *Delay Registration Review Requests***

If an employer, employee, employee representative or employee organization requests a delay in action of registration review, the request must be in writing to the AQMD within 10 days of registration submittal and cannot delay the period of time to exceed the 90th day after submittal.

**-- NOTE --**

---

*The Appendices to the guidelines contain the full technical derivations for the formulas and methodologies used and defined by Rule 2202. Most employers will not need to refer to the Appendices if they choose Employee Commute Reduction Option. However, the Appendices can provide a better understanding of the basis for Emission Reduction determinations, and also would be used by companies and consultants who may wish to seek funding under the Air Quality Investment option.*

---

*[This page intentionally left blank]*

## V. APPENDIX A

### A. Emission Reduction Target (ERT)

Emission Reduction Target (ERT) is the annual VOC, NO<sub>x</sub>, and CO emissions required to be reduced by each worksite based on the number of employees reporting to work during the peak window and the appropriate Performance Target Zone in accordance with Rule 2202. The ERT for each pollutant, for each worksite may calculated by using the following equation and appropriate commute emission factors from Tables V-1, 2, or 3.

$$ERT_{(e)} = \left[ \text{Employees} \times EERF_{(e)} \right] - [VTEC]$$

where

- ERT<sub>(e)</sub> = Emission Reduction Target for Emittent (e)  
 (e) = Emittent (NO<sub>x</sub>, VOC, CO, etc.)  
 Employees = Average daily number of employees reporting to work in the Peak Window<sup>1</sup>  
 EERF<sub>(e)</sub> = Employee Emission Reduction Factor for Emittent (e) determined by year of registration submittal and the worksite Performance Target Zone per Tables V-1, 2, or 3.

<b>Emission Year</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>CO</b>
<b>2000</b>	<b>5.73</b>	<b>4.83</b>	<b>45.35</b>
<b>2001</b>	<b>5.22</b>	<b>4.42</b>	<b>42.27</b>
<b>2002</b>	<b>4.81</b>	<b>4.01</b>	<b>39.19</b>
<b>2003</b>	<b>4.40</b>	<b>4.01</b>	<b>36.12</b>
<b>2004</b>	<b>3.99</b>	<b>3.50</b>	<b>33.04</b>
<b>2005</b>	<b>3.48</b>	<b>3.50</b>	<b>29.96</b>
<b>2006</b>	<b>3.48</b>	<b>3.08</b>	<b>28.22</b>
<b>2007</b>	<b>3.07</b>	<b>3.08</b>	<b>26.88</b>
<b>2008</b>	<b>2.66</b>	<b>3.08</b>	<b>25.55</b>
<b>2009</b>	<b>2.66</b>	<b>2.67</b>	<b>23.80</b>
<b>2010</b>	<b>2.15</b>	<b>2.67</b>	<b>22.47</b>

**Table V-1: Employee Emission Reduction Factor: Performance Target Zone-1.**

<sup>1</sup> Monday through Friday between the hours of 6:00 a.m. and 10 a.m.

---

<b>2000</b>	<b>4.40</b>	<b>3.80</b>	<b>35.19</b>
<b>2001</b>	<b>4.10</b>	<b>3.39</b>	<b>32.83</b>
<b>2002</b>	<b>3.79</b>	<b>3.08</b>	<b>30.37</b>
<b>2003</b>	<b>3.38</b>	<b>3.08</b>	<b>28.01</b>
<b>2004</b>	<b>3.07</b>	<b>2.78</b>	<b>25.65</b>
<b>2005</b>	<b>2.76</b>	<b>2.78</b>	<b>23.19</b>
<b>2006</b>	<b>2.76</b>	<b>2.36</b>	<b>21.85</b>
<b>2007</b>	<b>2.36</b>	<b>2.36</b>	<b>20.83</b>
<b>2008</b>	<b>2.05</b>	<b>2.36</b>	<b>19.80</b>
<b>2009</b>	<b>2.05</b>	<b>2.06</b>	<b>18.47</b>
<b>2010</b>	<b>1.74</b>	<b>2.06</b>	<b>17.44</b>

**Table V-2: Employee Emission Reduction Factor: Performance Target Zone-2.**

<b>Emission Year</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>CO</b>
<b>2000</b>	3.07	2.57	24.42
<b>2001</b>	2.87	2.36	22.78
<b>2002</b>	2.56	2.16	21.03
<b>2003</b>	2.36	2.16	19.39
<b>2004</b>	2.15	1.85	17.75
<b>2005</b>	1.84	1.85	16.11
<b>2006</b>	1.84	1.64	15.18
<b>2007</b>	1.64	1.64	14.47
<b>2008</b>	1.43	1.64	13.75
<b>2009</b>	1.43	1.44	12.83
<b>2010</b>	1.23	1.44	12.11

**Table V-3: Employee Emission Reduction Factor: Performance Target Zone-3.**

## **B. Vehicle Trip Emission Credit (VTEC)**

Vehicle Trip Emission Credits (VTEC) for various options are listed below:

### **For Peak Commute Trip Reductions**

$$\text{VTEC} = \left[ \frac{\text{Creditable Commute}}{\text{Vehicle Reductions (CCVR)}} \right] \times \left[ \frac{\text{Emission Factor (EF)}}{\text{lbs/year}} \right]$$

where

CCVR = The daily average of total commute vehicle reductions that are real, surplus, and quantifiable.

EF = Emission Factor

### **Other Work- Related Trip Reductions**

$$\text{VTEC} = \left[ \frac{\text{Creditable Trip Reductions (CTR)}}{\text{CF}} \right] \times \left[ \frac{\text{Emission Factor (EF)}}{\text{lbs/year}} \right]$$

where

CTR = The daily average of total one-way trip reductions that are real, surplus, and quantifiable. A round trip is considered to be two one-way trips.

CF = 2.0 for A.M. Peak Window  
2.3 for Other Trips

EF = Emission Factor of each Emittent (Table V-4)

## **C. Emissions Calculation Data**

### **Emission Factor**

Table V-4 shows the annual emissions factors for VOC, NO<sub>x</sub>, and CO (pounds/year per daily commute vehicle).

In calculating VTECs for Commute Trip Reductions, employers may utilize data obtained by one of the following methods:



- 
- (a) Default data based on the weighted average of the average vehicle ridership survey data of the previous three years; or
  - (b) Data obtained by conducting an average vehicle ridership survey in accordance with Rule 2202 - Commute Reduction Program Guidelines; or
  - (c) Data obtained by an equivalent methodology approved by the Executive Officer.

<b>Emission Year</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>CO</b>
2000	13	11	103
2001	12	10	96
2002	11	9	89
2003	10	9	82
2004	9	8	75
2005	8	8	68
2006	8	7	64
2007	7	7	61
2008	6	7	58
2009	6	6	54
2010	5	6	51

**Table V-4: Emission Factors (lbs/year per daily commute vehicle).**

### **Trips per Vehicle Adjustment Factor**

The trips per vehicle adjustment factor, for the purposes of Rule 2202 is equal to 2.0 trips per daily commute vehicle. This factor accounts for the trip to work and the return trip home.

### **Adjustment Factor**

Due to the differences in emission rates due to travel demand and vehicle speeds, trip reductions are subject to a trip adjustment factor of 1.15 for trips reduced outside of the a.m. peak period.

### **Conversion Factor**

Rule 2202 combines the trips per vehicle adjustment factor (TPV) with the adjustment factor to meet a standardized trip (ADJ(CTR)) and presents the product of the two variables as an overall conversion factor (CF), as follows:

$$CF = TPV \times ADJ(CTR)$$

Therefore, with a TPV equal to 2.0 and an ADJ of 1.0 for a.m. peak period trips and 1.15 for other trips, the conversion factor is equal to:

$$\begin{aligned} \text{CF} &= 2.0 \times 1.0 \\ &\quad 2.0 \text{ (for a.m. peak window trips)} \\ \text{CF} &= 2.0 \times 1.15 \\ &= 2.30 \text{ (trips outside the a.m. peak window)} \end{aligned}$$

#### **D. Emission Credits From Old-Vehicle Scrapping**

An old-vehicle scrapping program implemented in accordance with Rule 1610 - Old-Vehicle Scrapping will result in the generation of MSERCs. Employers can apply/use MSERCs obtained from an old-vehicle scrapping program towards demonstrating compliance with their ERTs. The old-vehicle scrapping may result in different relative emission reductions of VOC, NO<sub>x</sub> and CO compared to work commute trips. Employers that implement old-vehicle scrapping and end up with surplus emission reductions with respect to some of the pollutants can bank these credits and use them towards their future ERT, or trade them to other employers. Alternatively, employers that have a shortfall in meeting their ERTs can purchase surplus MSERCs from other employers. MSERCs shall be valid in accordance with the limitations as set forth in Rule 1610.

Emission credits may also be obtained from MSERCs generated under Rule 1612 (Clean On-Road Vehicles), Rule 1620 (Clean Off-Road Mobile Equipment) and other mobile source offset programs specified in Regulation XVI. Other sources of emission credits include Regulation XIII and Regulation XXV.

## VI. APPENDIX B

### A. Emission Generation

Motor vehicles are responsible for the generation of VOC, NO<sub>x</sub>, and CO emissions. These pollutants are linked to either the combustion process of the engine or to the evaporation of the motor fuel from the storage and delivery system. These processes can be further categorized into different operating modes of the vehicle. Combustion emissions are usually higher during start-up, and are even higher during "cold" starts, since the vehicle's emission control device operates more efficiently at elevated temperatures. In addition, since the rate of evaporation increases at higher temperatures, more emissions result during the "hot soak" period following a trip. Table VI-1 below lists the vehicle trip generated emission sources.

VOC	NO <sub>x</sub>	CO
Cold/Hot Start Ignition	Cold/Hot Start Ignition	Cold/Hot Start Ignition
Running Exhaust	Running Exhaust	Running Exhaust
Hot Soak Evaporation		
Running Losses		
Resting Losses		
Diurnal Evaporation		

**Table VI-1: Vehicle Trip Generated Emission Sources.**

### B. EMFAC and BURDEN Models

AQMD relies on the California Air Resources Board (ARB) EMFAC computer model to produce emission factors which are then used as input into ARB's BURDEN computer program to generate emissions inventories. The emissions inventories can then be categorized, for reduction quantification purposes, into a trip component, and a vehicle miles traveled (VMT) component.

#### **Trip Component**

The emission sources categorized as a trip component include the start ignition emissions, and the hot soak evaporation emissions. Emissions from these sources are therefore represented as pounds (grams) per trip.

### **VMT Component**

The emission sources categorized as VMT components include the running exhaust, and running loss emissions. Emissions from these sources are represented as pounds (grams) per VMT.

### **Resting and Diurnal Evaporation**

The remaining emissions are not attributed to trip reduction programs; resting and diurnal evaporation occur at a rate independent from the vehicle's trip VMT rate.

## **C. Daily Commute Vehicle Emission Factor**

### **Assumptions**

The calculation of daily commute vehicle emission factors rely on the following assumptions:

1. The trip generation rate assigned to daily commute vehicles, for the purposes of Rule 2202, is 2.0 trips per daily commute vehicle.
2. The regional emission generation rates, daily trip, daily VMT, and other parameters, as determined by the ARB BURDEN and EMFAC computer models, are accurate and representative for the years, 1995, 2000, and 2010.
3. The parameters generated by BURDEN are accurately represented by linear interpolation for the intermediate years between 1995 and 2010.
4. The average work-trip length, according to the Commuter Transportation Services 1993 State of the Commute, is accurate and representative, and equal to 15 miles.
5. Reactive organic gas emissions from diurnal and resting loss evaporation are constant and independent from the vehicle trip VMT rate.
6. Commuting vehicles operate primarily in cold start mode.
7. The number of annual operating days for commute vehicles equal to 260 days per year, as presented in the ARB draft document, An Emissions Formula for Employer-Based Trip Reductions (January 1995), is accurate and representative.
8. The ARB BURDEN model produces emissions inventories corresponding to six time periods. Two of these correspond to the morning and afternoon peak commute periods (i.e., 6 a.m. - 9 a.m. and 3 p.m. - 6 p.m.). These two period-

specific emission inventories, with corresponding VMT, were used to develop grams per miles emission rates.

9. Trip end emissions are based on overall South Coast Air Basin Inventories.
10. Annual average emission factors were determined based on ARB BURDEN ozone planning and CO planning inventories, based on the following weighted average: (7/12 x ozone planning inventory) + (5/12 x CO planning inventory).

### **Methodology**

Annual emissions per daily commute vehicle are therefore, for each pollutant and year:

$$\left[ \begin{array}{c} \text{Emission} \\ \text{Factor} \end{array} \right] = 2.0 \text{ TPV} \times \left[ \left[ \begin{array}{c} \text{Emissions per} \\ \text{Vehicle Trip} \end{array} \right] + \left[ \begin{array}{c} \text{Emissions} \\ \text{per VMT} \end{array} \right] \times 15 \right] \times 260 \text{ dpy}$$

Where TPV = Trips per Daily Vehicle  
dpy = Days per Year

### **D. Emission Factor Data**

Tables V-1, 2, 3 and 4 were developed based on the ARB BURDEN model output. These values were used to derive the daily commute vehicle emission factor. The calculated emission factor represents emissions from light-duty vehicles (LDV), which are considered to be passenger cars and light duty trucks, since both are used for work commute purposes.

		<b>RUNNING EXHAUST</b>	<b>COLD START EXHAUST</b>	<b>RUNNING LOSS</b>	<b>HOT SOAK</b>
<b>YEAR</b>	<b>TYPE</b>	<b>(grams/mi)</b>	<b>(grams/trip)</b>	<b>(grams/mi)</b>	<b>(grams/trip)</b>
1995	LDV	0.535	5.179	0.338	0.955
2000	LDV	0.258	3.46	0.256	0.53
2005	LDV	0.142	1.975	0.186	0.349
2010	LDV	0.103	0.600	0.117	0.234

**Table VI-2: VOC Mobile Source Emission Factors.**

START YEAR	TYPE	RUNNING EXHAUST (grams/mi)	COLD START EXHAUST (grams/trip)
1995	LDV	0.712	2.762
2000	LDV	.485	1.973
2005	LDV	.353	1.514
2010	LDV	.268	1.225

**Table VI-3: NO<sub>x</sub> Mobile Source Emission Factors.**

YEAR	TYPE	RUNNING EXHAUST (grams/mi)	COLD START EXHAUST (grams/trip)
1995	LDV	6.566	54.484
2000	LDV	3.214	41.484
2005	LDV	2.326	24.081
2010	LDV	1.921	15.781

**Table VI-4: CO Mobile Source Emission Factors.**

VOC Emission Factor for Calendar Year 1995:

Trip End Component:

$$= (\text{Cold Start Exhaust Emissions}) + (\text{Hot Soak Emissions})$$

$$= 5.179 \text{ grams/trip} + 0.995 \text{ grams per trip} = 6.174 \text{ grams per trip}$$

VMT Component:

$$= [(\text{Running Exhaust}) + (\text{Running Loss})] \times \text{trip length}$$

$$= (0.535 \text{ grams/mi} + 0.338 \text{ grams/mi}) \times 15 \text{ miles}$$

$$= 13.100 \text{ grams/trip}$$

---

**VOC Emission Factor:**

$$\begin{aligned} &= 2.0 \text{ trips per vehicle/day} \times (6.174 + 13.100 \text{ grams per trip}) \times 260 \text{ days} \\ &\text{per year} = 22 \text{ lb/year per daily commute vehicle} \end{aligned}$$

Table V-4 lists the remaining daily commute vehicle emission factors.

The emission factors shown in Table V-1, V-2, and V-3 may be modified to site specific emission factors reflecting vehicle age and trip length characteristics of the employee vehicle fleet.

## **VII. GLOSSARY**

1. **ANNUAL REGISTRATION** means an annual form submitted by an employer to the AQMD per paragraph (i)(1) of the Rule.
2. **AVR DATA COLLECTION METHOD** is a method for gathering employee commute mode data needed to calculate an employer's average vehicle ridership.
3. **COMPRESSED WORK WEEK (CWW)** applies to employees who as an alternative to completing basic work requirement in five eight-hour workdays in one week, or 10 eight-hour workdays in two weeks, are scheduled in a manner which reduces vehicle trips to the worksite. The recognized compressed work week schedules for this Rule are 36 hours in three days (3/36), 40 hours in four days (4/40), or 80 hours in nine days (9/80).
4. **DISABLED EMPLOYEE** means an individual with a physical impairment which prevents the employee from traveling to the worksite by means other than a single-occupant vehicle.
5. **EMPLOYEE COMMUTE REDUCTION PROGRAM** means a triennial program or annual analysis under the Employee Commute Reduction Program option, submitted to the AQMD, in accordance with the companion guidelines.
6. **EMPLOYEE** is any person employed by a person(s), firm, business, educational institution, non-profit agency, or corporation, government or other entity. The term excludes seasonal employees; temporary employees; volunteers; field personnel; field construction workers; and independent contractors.
7. **FIELD CONSTRUCTION WORKER** means an employee who reports directly to work at a construction site.
8. **FIELD PERSONNEL** means employees who spend 20% or less of their work time, per week, at the worksite and who do not report to the worksite during the peak period for pick-up and dispatch of an employer-provided vehicle.
9. **HOLIDAYS** are those days designated as National and State Holidays, that shall not be included in the survey period.
10. **INDEPENDENT CONTRACTOR** means an individual who enters into a direct written contract or agreement with an employer to perform certain services and is not on the employer's payroll.
11. **LOW-INCOME EMPLOYEE** means an individual whose salary is equal to, or less than, the current individual income level set in the California Code of Regulations,



Title 25, Section 6932, as lower income for the county in which the employer is based. Higher income employees may be considered to be "low-income" if the employees demonstrate that the program strategy would create a substantial economic burden.

12. **PART-TIME EMPLOYEE** means any employee who reports to a worksite on a part-time basis fewer than 32 hours per week, but more than four hours per week. These employees shall be included in the employee count for purposes of Rule applicability; and for emission reduction calculations of the employer provided the employees report to the worksite during the Peak Commute Window.
13. **PEAK COMMUTE WINDOW** is the period of time, Monday through Friday between the hours of 6:00 a.m. and 10:00 a.m.
14. **PERFORMANCE TARGET ZONE** for each worksite is determined by its geographic location within the geographic boundaries as described in Attachment I of Rule 2202.
15. **POLICE/SHERIFF** means any employee who is certified as a law enforcement officer and is employed by any state, county or city entity. Such employees are only police officers and sheriffs who perform field enforcement and/or any investigative functions. This would not include employees in non-field or non-investigative functions. These employees shall be included in the employee count for Rule applicability but are not required to be included in the number of employees in the peak window and may therefore, be exempted from the average vehicle ridership (AVR) survey. Those worksites electing to exclude such employees from the AVR survey and calculation must provide the basic ridesharing support strategies including but not limited to ridematching and transit information for all employees as well as preferential parking and guaranteed return trips for said employees who are ridesharing.
16. **SEASONAL EMPLOYEE** means a person who is employed for less than a continuous 90-day period or an agricultural employee who is employed for up to a continuous 16-week period.
17. **STUDENT WORKERS** are students who are enrolled and gainfully employed (on the payroll) by an educational institution. Student workers who work more than four hours per week are counted for Rule applicability and if they report to work during the 6:00 a.m. - 10:00 a.m. window are counted for emission reduction calculations.
18. **TELECOMMUTING** means working at home, off-site, or at a telecommuting center, for a full workday, that eliminates the trip to work or reduces travel distance by more than 50%.

19. TEMPORARY EMPLOYEE means any person employed by an employment service or agency, that reports to a worksite other than the employment agency's worksite, under a contractual arrangement with a temporary employer. Temporary employees are only counted as employees of the temporary agency for purposes of Rule applicability.
20. TRANSPORTATION MANAGEMENT ASSOCIATION OR TRANSPORTATION MANAGEMENT ORGANIZATION (TMA/TMO) means a private/non-profit association that has a financial dues structure joined together in a legal agreement for the purpose of achieving mobility and air quality goals and objectives within a designated area.
21. WORKSITE EMPLOYEE THRESHOLD means 250 employees employed at a single worksite for the prior consecutive six-month period calculated as a monthly average and 33 or more employees scheduled to report to work during the Peak Commute Window any one day during the prior consecutive 90 days.